Bacteria → Gm- → Plemomorphic → Rickettsia

* Small | obligate parasite (only grow in cytoplasm) | Have LPS (less potent)
* R: Animals + Arthropods | V: Arthropods | EH: Humans
* Pathogensis
  1. Enter host by stimulating phagocytosis/endocytosis
  2. Degrade phagosomal membrane (w/ phospholipase)
  3. Replicate in cell + Release via Actin Polymerization “highway”
  + Have predilection for endothelial cells → ↑ vascular permeability

**R. rickettsia → Rocky Mountain Spotted Fever**

* Due to pathology, decreases may involve: RT | CNS | GI | Renal
* Many host factors: Male | ↑ age | race | Alcohol abuse | G6PD deficiency → much more rapid disease
* **Epidemiology**
  + South-Atlantic and south-central regions of US + some Central & South America
  + During April-September
  + V: Wood tick (Dermacentor andersoni) + Dog tick (Dermacentor variabilis)
    - Requires around 24-48 hours of contact (less than Lyme disease)
* **Characteristics**
  + Incubation: 5-10 days
  + 1° - Sudden onset of fever, severe H/A, rash + hx of tick bite
    - Rash may appear 2-5 days after onset of fever
    - Rash – small, flat, pink, non-itchy spots on wrists, forearms, and ankles
  + 2° - Rash, Abd pain, Jt pain, Diarrhea
    - Rash – petechial rash (35-60%) involving palms/soles
      * Starts on extremities → works inward
  + 3° - Purpura and skin necrosis/gangrene may develop
* **Mortality**
  + If untreated – 20-25% mortality | in untreated elderly - >70% mortality
* **Diagnosis**
  + Need to base treatment on epidemiologic + clinical clues
    - Tick exposure | rash | severe H/A | Fever | Hyponatremia | Thrombocytopenia | ↑ enzymes
  + Use PCR or culture in host cells if possible
* **Treatment**
  + DOC – Doxycycline

**R. akari → Rickettsial pox**

* Transmitted by mites
* Biphasic Disease

1. Red papule at site of bite after 1-2 weeks
2. Irregular fluctuating fever

* T: DOC – Doxycycline

**R. prowazekii → Epidemic Typhus**

* Epidemiology
  + Transmitted via lice by its feces rubbed into bite wounds
  + Occurs in crowded unsanitary areas in mountainous areas of Africa, South America, Asia
* Characteristics
  + Incubation: 1-2 weeks
  + 1° - Intense H/A, chills, fever, myalgia with rash on 4th-7th day
    - Rash starts on upper trunk + spreads outward
  + 2° - Alteration of mental status (stupor to coma)
* Brill Zinsser disease – Relapse of epidemic typhus after may decades
* Mortality - <40% if untreated
* Pathophysiology
  + Uses endothelial cells but NO actin-based motility
  + Bacteria accumulates in cytoplasm until cell ruptures

**R. typhi → Endemic/Murine Typhus**

* R: Rodents | V: Oriental rat flea or rat lice | Prevalent in Temperate Coastal Regions
* Same characteristics as Epidemic Typhus but milder
* Mortality: if untreated, 1-4%

**Orienta tsutsugamushi → Scrub Typhus**

* R: Rodents | V: Larval mite bite | Prevalent in SE Asia, India, Japan + Australia
* Same characteristics as Epidemic Typhus but milder
* Mortality: if untreated, 1-60%

Bacteria → Gm- → Pleomorphic → Coxiella

**Coxiella burnetii → Query fever**

* Obligate intracellular pathogen
* R: Wild Animals | V: ticks
* Intracellular Cycle
  + Small-Cell variant (SCV)
    - Metabolically inactive | spore-like | enters phagocytotic cell
    - Once pH ↓ → SCV becomes active LCV
  + Large-Cell variant (LCV)
    - Metabolically active | Intracellular form | Replicate until signals to become SCV
* **Epidemiology**
  + Aerosol | Animals shed in feces/urine | Very resistant to killing
  + Elderly | Summer months
  + Once entered body via lungs, persists in macrophage as they disseminate throughout body
* Acute Disease
  + Only 50% show symptoms
  + Sudden onset of high fever (1-2 weeks) → Atypical pneumonia (30-50%) | Hepatitis
  + Self-limiting in a few months
* Chronic Disease
  + Uncommon but serious| Acute → chronic (1-20yrs afterwards)
  + Complication: Endocarditis
  + Mortality: >65% with chronic Q fever die
* **Diagnosis**
  + Acute: IgM phase II > phase I | Chronic: IgG phase I > IgG phase II
  + Phase I: initial form of LPS + highly infectious
  + Phase II: form of LPS later in disease + less infectious
  + Abs persist for months-years afterwards
* **Treatment**
  + DOC – Doxycycline
  + If chronic endocarditis → multiple drugs
  + Vaccine available
* **Biodefense**
  + Highly infectious + Resistant to drying
  + Easily weaponized | Category B agent